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STUDENT ESSAY

U.S. RAILROADS--A MILITARY ASSET

BY

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Essay examines US strategic mobility requirements related to support of a 1½ war scenario. ~~The study~~ embraces mobility parameters from outloading origins to intratheater movement at destinations and the mobility shortfalls are stated as (in order of priority) sealift, airlift, intratheater lift, destination port constraints, and CONUS rail capacity. Recommendations for reducing the shortfalls include: creating and following a clear and ambitious plan to re-establish a very strong merchant marine, continuation of present plans for improving C-5 and C-141 inventories and

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adding to the (CRAF), developing and purchasing the C-X aircraft and pre-positioning trucks and (MHE) for contingency use only, constructing and prepositioning floating piers with cranes, and developing a conus railroad net structured after the defense highway net.

Material Handling Equipment

US ARMY WAR COLLEGE

INDIVIDUAL RESEARCH BASED ESSAY

STRATEGIC MOBILITY--A SYNOPSIS OF THE PROBLEM

BY

THOMAS K. SHELDON

16 APRIL 1982

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I. INTRODUCTION

> STRATEGIC MOBILITY - The capability to deploy and sustain military forces worldwide in support of national strategy. (JCS PUB-1)

This definition of strategic mobility doesn't provide much insight into the problem nor for that matter it does not even intimate that a problem exists. Don't we have military forces deployed worldwide now? Aren't we sustaining those forces? Weren't we able to deploy and sustain our forces during WWII, Korea, and Vietnam? Why all the hullaballoo about strategic mobility?

The American people are becoming more committed to a strong defense and the Administration and Congress have undertaken positive action to strengthen the US military forces. Improvements are underway to restore our strategic and theater nuclear forces to levels required to insure deterrence. Modern equipment to replace equipment developed prior to Vietnam is being procured and fielded by all the services. Additional funds are being spent on such things as training, repair parts, ammunition, and recruiting quality personnel. In short, long overdue steps are being taken to ensure that if someone does start a war that we have sufficient firepower to defend our interests. But, this firepower will do little good if it is located in the United States and we are unable to move it to the war in a timely manner.

Major General Russ in his article "We Have to Get There In Time"[1]

likens the strategic mobility problem to the Green Bay Packers being snowbound at home on Sunday afternoon when the game is scheduled to be played in another NFL city. Star players in top physical condition, well coached, with great game plans, and full of can-do spirit can't win a football game if they aren't in the stadium with proper equipment. In the football analogy the game could be postponed and the entire season would not be lost for the Packers. But, if the Russians were to suddenly, without warning, attack the Persian Gulf oil fields the war would not be called off because US Forces could not deploy in time. Not only would our enemies not "call the game" because we weren't able to get there in time; but, they can be expected to capitalize on our strategic mobility weakness in forwarding their national interests.

A. Causes of the Problem.

There are a number of reasons why strategic mobility is both a concern and a problem for the United States.

1. The United States is committed to defense—we will not be the initiator of any conflict. This requires an ability to react to aggression and precludes designing a force and planning lift for one specific conflict. Our forces must be flexible. The one and one-half war force-sizing scenario says that we must be prepared to fight a war in some other part of the world while still honoring our commitment to NATO. Because we don't know where the "half-war" will take place we must be prepared to fight (and win) anywhere in the world.

2. A cursory look at a world map reveals a consistent fact about the distance of the United States and the Soviet Union from potential trouble spots such as Iran, Korea, and Western Europe. The Soviet Union is relatively close while the United States is separated by great

distances. Soviet forces stationed within the boundary of the Soviet Union can virtually "drive" to these potential areas of operation. While we do have some forward deployed forces, most of our combat capability would have to deploy long distances and over oceans to get to the war. Simply stated, they are already "over there" and we need to get "there". In order to get there we need airlift and sealift or we need to forward deploy sufficient forces around the world. The second alternative is not economically, socially, or militarily possible. Therefore, responsive lift is required.

3. Modernization of our forces has had a negative impact on strategic mobility. The requirement for modern weapon systems to meet the Soviet threat has taken a large part of the Defense budget. This has left relatively few dollars to modernize the lift assets. While it can be argued that it does little good to procure modern weapons that can't be deployed; there is probably a stronger argument that says it makes little sense to be able to rapidly deploy second-rate weapons. Modernization efforts have not only cut into lift improvement resources, they have exacerbated the strategic mobility problem by providing both more and heavier weapons to be lifted. The modernization programs have also significantly increased fuel and ammunition support requirements which impact on the amount of lift required to sustain the force.

4. Strategic mobility is somewhat of a stepchild within the Department of Defense. Responsibility for providing lift rests with the Air Force and the Navy. Yet, the forces that need to be lifted are mainly Army and Marines. The Air Force and Navy see a more imperative need to spend resources on weapon systems rather than lift. The Army on the other hand feels that limited Army resources should not be allocated to Air Force and Navy missions. This divergence of responsibility

magnifies the problem of advocating increased funding for something as "drab" as strategic mobility compared to the "flash" of aircraft carriers or bombers. As a result what should be a high priority requirement is relegated to the list of things that would be done if we had "a few dollars more".

5. The National Transportation Policy of the United States states that we will rely on the private sector to meet the nation's requirements for transportation and the government will intercede only when the private sector can't (or won't) meet these needs. For this reason we don't have nationalized railroads, airlines, or steamship lines like most of the countries of the world. Because of the necessity to operate at a profit the transportation industry of the United States is neither designed nor sized to support the Defense mission. As competition (both foreign and domestic) forced cutbacks in ocean shipping and intercontinental air routes and even rail service, the Department of Defense was slow to recognize the growing gap between commercial transport capability and national security requirements. And, the strategic mobility problem became worse despite the improvements in transportation equipment (e.g. faster, larger, more efficient aircraft).

B. Magnitude of the Problem.

Many people look at strategic mobility as only airlift or sealift from CONUS ports to ports in other parts of the world. Strategic mobility is much more comprehensive. As seen in figure 1, strategic mobility begins with readiness at CONUS military facilities and does not end until the personnel and equipment are positioned to fight the war (i.e. on the FLOT). While the problem appears to be linear (e.g. a day saved moving the troops and equipment to CONUS ports is a day saved in the

total time it takes to get units positioned on the front line) it is in reality a nonlinear network problem. And, unless the system is balanced, bottlenecks eliminated, and the critical path shortened the total time it takes to get from "here" to "there" may or may not be decreased. For instance, it does not matter how fast we can get units from posts, camps, and stations; loaded onto super fast cargo vessels; and safely convoy them to remote parts of the world if we do not have the capability to get the equipment off the ships once they arrive. While this point appears obvious, there are numerous examples where planners and operators have lost sight of this fact in their zeal to shorten a specific link in the network. This paper will examine the "links" rather than the "network". Yet, all the links must be put together and run as a whole by gaming or computer simulation to determine the overall impact of improvements or degradations in the various parts of the strategic mobility equation.

CONUS PORTION OF STRATEGIC MOBILITY

The CONUS portion of strategic mobility is made up of (1) actions at CONUS outload origins, (2) intra-CONUS movement to ports of embarkation (POE'S), and (3) airport and seaport reception and loading.

A. CONUS Outload Origins.

Strategic mobility actions at CONUS posts, camps, and stations consist of preparations for movement and loading for CONUS movement. Preparation for movement includes unit readiness, integration of filler r personnel and equipment, and load planning. Most of these actions do not present major problems for the active forces. But, early deploying Reserve Component units have to consider a number of mobilization vari-

ables that make planning for movement quite difficult. Actual loading must consider availability of lift assets and materiel handling equipment as well as the throughput capability of the transportation facilities. Planning for movement is often a low priority initiative but for the most part it is not a limiting link. Actual loading may be a problem and loading facilities must be surveyed to determine if the capability meets or exceeds the loading requirements.

B. Movement to Ports.

The capacity of the United States transportation industry to move units and equipment from CONUS outload origins to airports and seaports is open to argument. Data are available to support either side — not much of a problem or large problem — depending on the assumptions and the amount of other than military cargo that must move. DOD has done a fair job of projecting purely military requirements on the CONUS transportation system during mobilization. Missing are projections of critical commercial and Defense ancillary requirements such as movement of raw materials and heavy machinery to build-up the industrial base. Until these total requirements are determined and matched against system capacity the argument is not likely to be resolved. The two primary modes for movement to ports are rail and highway.

1. Rail. The capacity of the United States railroads to support movements to the parts is also debatable. The pessimists point to factors like:

- o More than ten thousand derailments per year is an indicator of the condition of the US railroad system.
- o Over fifty thousand miles of active tracks abandoned since 1945.

- o A shortage of heavy duty rolling stock severely limits the number of military units that can be moving at the same time.[2]

Optimists are apt to cite:

- o US rail traffic in 1979 was 30 percent higher than 1944, the peak year of World War II.[3]
- o US rail industry proved its resiliency most recently when it successfully moved millions of tons of grain to ports during the Russian grain sales.
- o Modernized command and control techniques allow the US railroads to route traffic to maximize the capacity of the rail net.

The truth is probably somewhere in between. Roadbed problems do exist which limit speed and can cause derailments; but, we must examine where these problems are in relation to our planned movements. The same is true of abandoned track — certainly elimination of unprofitable service between two remote cities in Maine should have little or no effect on National Defense. There is a limited number of heavy lift rail cars. But, how many are enough? Commercial rolling stock and the Defense Freight Rail Interchange Fleet (DFRIF) inventory include over 10,000 flatcars capable of transporting tanks.[4] The amount of cargo carried on the US railroads today compared to WWII must be matched against today's requirements vs. WWII. And, even with modern computers and communications for command and control, the movement of wheat to ports was very hectic and congested during the early stages of the Russian grain movement. All in all the United States railroad capacity is not as bad as most people think it is; but, specific bottlenecks must be identified and fixed.

2. Highway. The motor transport industry is much more decentralized than is the rail industry and as a result accurate data are more difficult to obtain. There is little doubt that tremendous motor transport capacity exists in the United States. How useful the industry will be for moving war materiel is more questionable. There are in the US commercial fleet approximately 3,300 lowboy trailers capable of carrying tanks, over 130,000 van type semi-trailers, and 60,000 flatbeds.[5] This capability should prove invaluable in moving equipment, bulk cargo, and sustaining supplies to the ports if it can be coordinated. Because there are so many independent truckers this may be difficult. In addition to the trucks there are over 20,000 intercity buses which could be used to transport military personnel.[6]

The national system of interstate and defense highways is a nationwide road net of 42,500 miles that has been designed to permit high speed movement of military equipment.[7] Because of this system it is not improbable that many military units would drive to port in the event of an emergency. Again, planning and coordinating the use of this important transportation asset is necessary to ensure uncongested movement.

C. Port Reception and Loading.

It is generally agreed that the United States' port capacity is more than sufficient to handle any strategic mobility mission. In addition to the numerous military and civilian airports there are over 1100 commercial ship berths and approximately 40 military controlled ship berths in the United States.[8] While the number of airports and ship berths are not limiting factors, transportation planners must consider:

- o Storage space for receiving and staging equipment

- o Inland transport reception capability
- o Available labor force

Reserve Component units will be used to control movement to and within the ports to prevent crippling port congestion. To better prepare these units to perform their port reception mission the Military Traffic Management Command (MTMC) has preplanned unit assignments and missions and the Reserve Component units train periodically on location to become familiar with the port facilities, the materiel handling equipment, and to get to know the civilian port authorities in assigned ports.[9]

D. CONUS Coordination.

As previously noted intra-CONUS coordination is required between commercial transportation companies, military planners and operators, and state and federal government authorities. During Nifty Nugget (the first government-wide mobilization exercise since WWII) held in October-November 1978 serious shortcomings in coordination were identified.[10] Since that time, actions have been taken to solve many of these problems through closer coordination — especially the military, Department of Transportation, and the Federal Emergency Management Agency (FEMA). MTMC has also taken positive steps to increase coordination between military planners and commercial transporters through its CORE (Contingency Response) program.

III. AIRLIFT

No nation in the world can match the United States' ability to move things and people by air. Yet, this capability is simply not enough. Studies are universal in this opinion. General William C. Moore summed

it up when he said " our organic resources and the CRAF produce a lot of aircraft capability. But continuing studies show that even with all our military transports and all the aircraft in the Civil Reserve Fleet we don't have enough cargo capability to meet a war in Europe."[11] Obviously, a contingency in another part of the world, at the same time as a NATO war would severely exacerbate the problem.

Airlift is fast and flexible and studies have shown that the shorter the conflict the greater the amount of cargo that goes by air. But regardless of length, there is always a certain amount of cargo that must go by air. Strategic airlift is needed to rapidly reenforce NATO, quickly deploy forces to other theaters of operation, and sustain the forces once they begin to fight.

A. Airlift Assets.

1. C141. The C141 is the workhorse of the military strategic cargo airfleet. There are approximately 234 C141's and the aircraft is no longer in production. It is capable of carrying 32 tons but it is usually limited by the size of the fuselage to cargos between 16 and 20 tons. The C141 can carry approximately 180 battle equipped troops. The aircraft does not have a mid-air refueling capability and during its use in flying supplies to Israel, was dependent on intermediate fuel stops. The Air Force is currently "stretching" the fuselages of the entire C141 fleet and adding aerial refueling capability. This will increase the range of the aircraft, make it less dependent on basing and overflight rights, and provide 30 percent more cargo space within the aircraft.

2. C-5. The C-5 is the only US aircraft that will carry outsized cargo like tanks and helicopters. There are 70 C-5's in the fleet and they have a design capability to carry two 50 ton tanks at a

time and have mid-air refueling capability. The C-5 currently has a structural problem with its wings — they are showing deterioration long before the aircraft's expected service life is up. The Air Force is reinforcing the wings on the C-5 fleet to provide a full 30,000 hours of flying time. This equates to a service life into the 21st Century. In the meantime the aircraft are being flown with reduced loads—one tank instead of two — to slow the wing deterioration process.

3. CRAF. The Civil Reserve Air Fleet (CRAF) is a major element of this nation's strategic airlift capability. Although it has never been activated in the twenty-seven years of its existence almost everyone agrees that CRAF is an effective program to meet defense emergency airlift requirements. In fact MAC estimates that CRAF provides about fifty percent of the total DOD strategic airlift capability.[12]

Under CRAF, the commercial air industry commits selected airlift resources (airplanes and crews) to the Department of Defense in time of emergency. There are a total of 462 aircraft in the CRAF fleet and they can be activated in three stages.[13]

- Stage I - 57 aircraft. Call-up is delegated to CINCMAC and Stage I provides maximum augmentation while permitting civil carriers to continue peacetime operations.
- Stage II - 122 aircraft. This stage is activated by the Secretary of Defense and is designed to provide augmentation for minor contingencies.
- Stage III - 462 aircraft. This stage can only be activated after the President or Congress has declared a national emergency.

All is not rosy with the CRAF program. Since it has never been

activated there is some question whether it will work when called upon. (e.g. Will the aircrews fly into a combat zone? Can the fleet be maintained and logistically supported?) Other problems faced by CRAF include the shortage of cargo aircraft in the fleet (less than half), the pending retirement of the narrow body fleet, reduced profits in the commercial air industry, and funding problems with the CRAF Enhancement Program. However, CRAF is an invaluable lift asset and actions must be taken to protect its existence and nurture its growth.

B. Airlift Problems.

In addition to the aircraft peculiar problems noted previously there are more basic problems concerning the strategic airlift capability.

1. Number of Aircraft. The size of the fleet is not large enough. Consider the following. Just to fly the 82nd Airborne Division to the Middle East would tie up nearly all US military aircraft for approximately two weeks.[14] To move one Army mechanized division would take 400 C-5 sorties and 1,200 C-141 sorties — five times as many flights as there are planes.[15] In general, studies show that the current airlift capability to support a NATO war scenario is one-fifth to one-third that required during the first 15 days of the war.[16] As the trend towards heavier Army divisions continues the situation will worsen rather than improve.

2. Heavy Lift. We are desperately short of airlift to carry outsize cargo. The only outsize capability we now have is the C-5. These 70 C-5's cannot satisfy our current outsize cargo requirements, much less the growing outsize requirements of our forces as they rebuild for the future. For example, over the next five years the outsize

requirements of an Army mechanized division are predicted to grow by 60 percent.[17]

3. Attrition. Complicating current airlift shortfalls are the effects of attrition. Even assuming NATO air superiority, one third of our aircraft may be lost during the first 180 days of combat.[18]

4. Support Requirements. As seen, the airlift requirements to support Army forces are large. The airlift requirements to support the airlift are also large and cannot be discounted. Much of the initial airlift and a portion of the follow-on flights will be used to support airlift forces. For example, when the US Air Force flew tanks and other equipment into Israel during the 1978 Yom Kippur War their refueling requirement forced them to take a ton of fuel out of Israel's reserves for every ton of cargo they delivered.[19]

C. Ongoing Improvements.

Some improvement is being made to the United States' strategic airlift capability. The C141 is being "stretched" by adding about 23 feet to the length of the fuselage and at the same time it is being refitted for mid-air refueling. The C-5 is having its wings strengthened and the Air Force has asked Congress for funds to purchase and additional 50 C-5 aircraft. Negotiations are underway with commercial airlines to include more wide-body aircraft in the CRAF program. The Air Force also plans to purchase 44 additional KC-10 advanced tanker/cargo aircraft. This will improve strategic mobility because of its refueler capability and its ability to carry an additional 50 tons of cargo.[20]

IV. SEALIFT

While airlift is fast and flexible and is certainly a necessary strategic mobility asset, approximately 90 percent of the equipment and sustaining supplies will be transported by sea during the next war. It is estimated that one dry cargo ship can deliver the equivalent tonnage of two and one-half days of airlift and when the first 10 ships arrive in the Persian Gulf they will deliver tonnage approximately equal to a full month of airlift.[21] During the 1973 Yom Kippur War the first cargo ship that arrived in Israel carried more supplies than the entire US airlift effort. But, as the air advocates are quick to point-out—the war was over by the time the first ship arrived. Thus, it is obvious that we cannot totally rely on one mode, we need both sufficient airlift and sealift to deploy and sustain our forces.

Today's logistic planners are looking at a shrinking United States merchant fleet which is approximately 40 percent of the pre-WWII and 10 percent of post-WWII size. It is also more specialized and less adaptable for movement of military cargo. A former Commander of the Military Sealift Command stated that "the present United States flag strategic sealift fleet is not capable of supporting the 'one-and-one-half war' contingency, or even a major 'one-war' requirement in its present condition."[22] Another source estimates that: "We now have less than 10 percent of the shipping required even to support a NATO war. In fact, our fleet is now smaller than the 700 merchant vessels we lost in World War II."[23] It is apparent that sealift may be in equally bad or worse shape than the airlift portion of the strategic mobility force.

A. Sealift Assets.

1. Types of Ships. There are generally four types of US flag vessels available to transport military materiel—roll-on-roll-off (RORO), barge carriers, breakbulk, and containerships.

- o RORO- RORO ships are the most flexible and have both side and stern ramps to expedite loading and unloading vehicles. They also have onboard gear for lift-on and lift-off operations. And, they have hatch openings through which cargo can be loaded and unloaded from the lower holds. RORO ships are best suited for unit deployments.

- o Barge Carriers- The barge ship systems, classified as lighter-aboard-ship (LASH) and sea barge (SEABEE), have the capability to load and discharge lighters and barges at anchorage. Berth space and crane support, however, are required to load and unload equipment into the barges. Barge ships are well suited for transporting military equipment and the SEABEE class can handle helicopters without major disassembly.
- o Breakbulk- Breakbulk ships have their greatest advantages in their flexibility to transport different types of cargo and the capability to load and discharge that cargo using the on-board gear. These vessels suffer from age and the inability to transport aviation unit equipment. The breakbulk ships are the most numerous of any of the ship classes in the US merchant fleet.
- o Containerships- The US merchant fleet has many large, fast,

modern containerships that have taken over much of the breakbulk trade. Containerships are generally considered unsatisfactory for unit deployments because much of a unit's equipment will not fit in the 8ft. by 8ft. by 20/40ft. containers. Also, many of the modern containerships require very large berths with shoreside container-handling cranes.

2. MSC Controlled Fleet. The most responsive source of wartime shipping are the ships owned by or chartered to the Military Sealift Command. MSC has 27 government-owned ships manned by civil service crews and another 26 chartered US flag ships, for a total of 53 ships.[24]

3. US Flag Merchant Fleet. The US Flag Merchant Fleet contains only 520 ships, of which approximately 300 are compatible with military cargo. Of the 300, over 100 are modern containerships.[25]

4. US Owned Foreign Flag Fleet. There are approximately 461 ships owned by US firms but registered in foreign countries and carrying foreign crews. These "flags of convenience" vessels are plying the world's trade route while avoiding US licensing and safety requirements and US Maritime Union salaries. Only 163 of the US owned foreign flag vessels are suitable for military use and most of these are tankers.[26]

5. National Defense Reserve Fleet (NDRF). The NDRF consists of 321 ships including 163 merchant types — 26 of these comprise the Ready Reserve Force (RRF). The NDRF or "mothball fleet" is maintained by the Maritime Administration for emergency use. The RRF is designed to be operational in 5-10 days while the other 137 vessels have a projected readiness schedule of 45 to 60 days. The 137 vesels are WWII

vintage and most feel that it would take months to activate many of these ships.[27]

6. NATO Pool. NATO allies pool a portion of their merchant fleet for use by any ally in a NATO war. Approximately 400-600 NATO merchant ships would be made available for sealift support. US needs would be in competition with those of other NATO allies. MSC projects that the US will be provided a large portion of the NATO pool in the event of a NATO war and these ships will greatly assist in meeting sealift requirements.[28]

B. Sealift Problems.

1. Sealift Capability. With an ideal mix of ships it would take three thousand ship arrivals in European ports each month to keep NATO in the war. If faced with a mixed bag of ships of mismatched types and capabilities monthly requirements could double.[29] As seen above there are available from all sources (including the NATO pool) 1000-2000 ships of various types and capability. Assuming all were made available on-time and with no attrition it would require from 2.5 to 6 crossings per month by each ship to support a NATO war. Optimistically, considering loading and unloading times, 2 crossings a month is about all that one could count on. Therefore, considering all sealift assets we are probably only able to meet optimistically 80 percent of sealift requirements and pessimistically 33 percent of our NATO sealift requirements. These figures of course would be further reduced in the event of a "one-half" war simultaneously occurring with the NATO war.

2. Attrition. Attrition on early convoys may reach 40 percent.[30] This not only reduces the size of the fleet; but, the necessity to convoy slows turn-around times.

4. Crews. During Vietnam, despite the fact that there was little risk, foreign crews frequently walked off ships when they were told Vietnam was their next destination. Certainly, many of the foreign crews on the "flag of convenience" vessels may do the same in the event of a NATO war. In addition to this potential crew problem, the Maritime Administration plans on US crews manning the NDRF vessels when they are activated from storage. These crews have not been predetermined (they would come from nonworking mariners) and this will slow activation at best and at worse limit the number of ships that can be crewed.

5. Status of NDRF Fleet. The NDRF fleet as mentioned earlier is old and decrepit. The US is probably banking too heavily on these vessels. During a recent REFORGER one of the newer RRF ships was to be activated to test movement techniques. The ship experienced mechanical problems and could not participate in the Europe-bound deployment.[31]

6. Offload Capability. While this problem will be discussed in greater detail later in the paper it is worthwhile to mention the fact that many of the vessels in the sealift fleet require special port facilities. These facilities such as container cranes, long and deep berths, and specialized materiel handling equipment may not remain available in a NATO war and are not now available in most other parts of the world.

C. Ongoing Improvements.

There is some light at the end of the sealift tunnel. More military and politicians are becoming aware of the deplorable condition of the United States' merchant fleet and its sealift capability (or lack of capability). While realization that there is a serious problem does not automatically equate to increased capability, it is a start. More

concrete improvements include acquiring eight 33 knot, SL-7 containerships by the Navy. Because of huge fuel consumption these ships are not effective to operate on a daily basis; but, their speed makes them a worthwhile hedge against emergencies. Fourteen similar, roll-on/roll-off T-AKX maritime prepositioning ships are being procured to support the Rapid Deployment Force. Presently the Navy has leased vessels to prestock enough equipment for a 12,000-man light Marine Amphibious Brigade at Diego Garcia Island in the Indian Ocean.[32] The Navy's ARAPAHO program is an effort to put antisubmarine equipment on commercial containerships.[33] This should reduce merchant ship attrition during war and free some combat vessels from convoy escort duties. Congress is looking seriously at regulatory relief for the US maritime industry. And, there are several bills in Congress that would allow the US fleet to better compete in moving commercial cargo—which in turn could revitalize the US maritime industry.[34] Most of the above improvements are stopgap measures and until we undertake a more long term program to build a strong merchant fleet our strategic sealift will remain in troubled waters.

V. DESTINATION

Inter-theater movement of military personnel, equipment, and sustaining supplies is certainly a major increment of strategic mobility. But, until the personnel and materiel are married-up and in position to fight the war the movement is not complete. This destination portion of strategic mobility consists of seaport and airport reception, staging, and intratheater movement. Problems associated with the destination portion of strategic mobility are to a large degree dependent on geography. For example, it would be much more difficult to move supplies

forward on the limited road net of Southwest Asia than it would be in Europe. However, there are also common problems such as the extremely limited over-the-shore capability that could plague operations in any theater.

A. Seaports of Debarkation.

Ship discharge is not especially time consuming during peacetime. considering a 20-hour workday, a RORO or barge-type vessel can be unloaded in approximately 1 day. A large container vessel can be discharged in 2 days.[35] In order to accomplish this the RORO ships must be alongside a pier that can handle their ramps, the barge-type vessels must have tug support and shoreside cranes, and container vessels are dependent on large gantry container cranes on the pier.

Port facilities are often taken for granted. In Europe, where most of our experience and study concerning strategic mobility has taken place, the ports are large, modern, and deep and have sufficient port handling equipment and stevedores to handle the large sealift tonnages necessary to support a NATO war. But, if the BENELUX ports are severely damaged by enemy air or sabotage we will most likely be faced with problems common to the rest of the world. Therefore, we must have the capability for alternate methods of discharge for a NATO war as well as a war in other parts of the world.

One of the most knotty problems concerning ship reception and discharge is how to discharge a large container ship (now so prevalent throughout the western world) without shoreside container cranes. Because container ships are not self-sustaining (can't unload using ship gear) ideas such as using helicopters and balloons have been attempted. The most practical solution seems to be placing mobile cranes on the

decks of the vessels. But, this will both increase discharge time (probably double) and limit the number of containers that a vessel can hold. Other problems that need to be examined are the shortage of military terminal service units in the total force, the almost nonexistent capability to conduct over-the-shore operations in the event ports are not available, and the lack of materiel handling equipment in the Army inventory.

For the above reasons seaport reception may be a critical link in the strategic mobility network. It bears examination for each contingency and for various situations within each contingency. During the early days of Vietnam much of the badly needed supplies and ammunition were on ships waiting offshore for pier space. When the ships were hurried into the ports supply accountability was lost as orderly port clearance was sacrificed to turn the ships around. This could very well happen again. For example, the total dry cargo discharge capability (commercial) in Iran is estimated to be approximately 2000 tons per day.[36] The capacity is barely enough to handle just the sustaining supplies of a 50,000 man force and does not consider port clearance capacity.

B. Airports of Debarkation.

The strategic mobility limitations found at destination airports are in many respects similar to those previously identified for seaports. Aerial port capacity is limited by the facility itself—the length and capacity of the runways, taxi space, and the amount of reception and staging area available. Airports also require considerable MHE for effective unloading and cargo transfer. But, unlike seaports (where some of the materiel handling equipment is fixed) airport MHE can be

delivered by early arriving aircraft. Planners must be aware that a large portion of the initial airlift effort may be used for delivery of personnel, equipment, and supplies to control, maintain, and unload follow-on aircraft. Airport security, like seaports, is critical for an uninterrupted flow of supplies. Airports differ from seaports in that refueling and maintenance capability is usually necessary at the destination airfields. Also, the Air Force must be concerned with intermediate airports as well as those at destination.

MAC has surveyed most of the world's airports to determine estimates of throughput capacity, facility peculiarities, and manpower and equipment requirements. Two areas which could improve reception and unloading at destination airports are to procure and preposition more MHE and to make more use of other than the main gateway airports during peacetime operations. This would lower peacetime efficiency but might provide invaluable experience for contingencies.

C. Staging.

Staging is preparing the equipment for forward movement, in-country processing of personnel, and marrying-up equipment (which will mainly come by ship) with the troops (who will mainly arrive by air). Planning factors for in-country processing are usually considered to be 4-6 days for equipment and 1 day for personnel. Just as ports have an estimated throughput capacity so do the staging areas. Factors that impact on this capacity are proximity of the destination airports to the seaports, access to road and rail nets, and the size and quality of the staging areas themselves. A key point to remember is that staging is the balance point for inter- and intratheater lift and it must be sized to eliminate bottlenecks.

Prepositioning of supplies and equipment such as prepositioned war reserves and POMCUS (prepositioning of materiel configured in unit sets) is a form of staging that conserves critical lift during the early days of a contingency. POMCUS in Europe is a savior to our limited lift capability, but it is costly in that either the additional equipment must be procured or units (usually Reserve Component) must train without all their authorized equipment. Also, prepositioned equipment in Europe provides little help for a contingency in other parts of the world. Prepositioning is only an alternative to building lift when you are relatively sure of the probability of a contingency or when it provides a deterrent to a contingency.

D. Intratheater Movement.

Although when the personnel, equipment, and sustaining supplies are in the overseas' staging areas they have already completed over 95 percent of their journey,they are of little use until delivered to where they are needed. Intratheater transportation consists of all modes of transportation—air, inland water, highway, rail, and pipeline—to get the personnel and materiel forward. Again, there are reliable factors that estimate the capacity of the transportation network (in tons or passengers per day) as well as the amount of transportation assets required to handle the requirements.[37] These factors while appearing low are probably reasonably accurate considering wartime conditions and the necessity to continue the mission over an extended period.

Two intratheater problems noted in most strategic mobility studies are the heavy reliance on host nation support and the failure to consider choke points. Host nation support in Europe has received a large amount of study and it is generally assumed that there is a high proba-

bility that it will be available. But, we have few or no alternatives if it is not available because we have drastically trimmed the transportation structure. Also, there appears to be a tendency to use the European host nation model for other contingencies where the assumption may be less valid. Choke points may be key bridges, mountain passes, or road junctions or they may be the vulnerability of an entire mode of transportation. The heavy dependence on the NATO pipeline and the large volume of cargo planned for movement by rail are two examples. Both of these nets are fairly easy to interdict and if they are broken the other modes of transportations can not pick-up the slack. An intratheater transportation "reserve" is just as important as a tactical reserve.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. Support to Plans.

There must be linkage between the strategic mobility capability and the requirements inherent in contingency plans. Ideally, mobility should be sized to meet the combat strategy. If this is not possible then the plans should be altered to allow for the strategic mobility shortfall. All plans involve risk and there seems to be a tendency to accept a strategic mobility shortfall as a planning risk while continuing to plan for the use of forces that simply cannot be deployed on-time and/or sustained once in place. That is not prudent risk—it is pure folly. The current unclassified strategic mobility literature is almost unanimous in the findings of its capability compared to the planning guidance.

1. NATO. The capability to support a NATO war is questionable:

- o Sufficient lift assets are marginally available for initial force deployments.
- o Probable attrition of sea and air assets will turn a difficult situation into the impossible.
- o Sustaining the force will be extremely difficult especially in the mid-range period of a protacted war.
- o Intratheater transportation dependence on host nation support is a potential weakness.
- o Dependence on the availability of fixed ports is a potential weakness.

2. Half-War. The capability to support a "half-war" is dependent on the location and the time available for deployment and force build-up:

- o Distances involved in most half-war scenarios are extremely long and would severely tax lift assets.
- o Lack of prepositioned equipment requires a large number of outsize air sorties.
- o Sustaining a 1 to 2 division sized force until the first ships arrive (30-90 days) uses almost all of the airlift.
- o Absence of an in-country logistical base (either in-place log units or viable host nation support) uses critical early lift assets and limits intratheater clearance and forward movement.
- o Military owned strategic mobility assets are not sufficient to support anything but an extremely small (1 division) force and therefore early "call-up" of commercial assets would be mandatory.

3. One and One-Half War. The capability to support a one and one-half war scenario (planning guidance) is simply not possible. The major functional disconnects between the "required" strategic mobility and the "available" strategic mobility are (in a rough order of priority) sealift, airlift, intratheater lift, destination port constraints, and CONUS rail capacity. It is in these areas that major improvement must be made if we are going to meet planning guidance. Other efforts may result in small increments of improvement in the total network or (most likely) improvement within one of the links but little or no improvement along the critical path.

B. Sealift.

Shortages of sealift capability impact on the strategic mobility requirements of almost every scenario. Sealift is needed to deploy the bulk of our CONUS based forces and to provide approximately 90 percent of the sustaining supplies. The Military Sealift Command (MSC) fleet is small and old, the US merchant fleet is also small and most of the ships are not designed for military requirements, and the reserve fleet is mainly WWII vintage that would take months to makeready for use. Improvements should be structured to increase the number of ships available, the responsiveness of the ships to an emergency, and the capability of the ships to carry military materiel.

One of the most critical goals this nation should have is to have a strong merchant marine. A maritime nation needs both a strong Navy and a strong merchant marine. The shortage of strategic mobility is only one facet of the larger merchant marine problem. Building a strong merchant marine requires a national commitment and sizeable investment in resources—but it must be done. In order to accomplish this the

United States should:

- o Establish a time-phased plan to develop and maintain a merchant marine sized to our power projection requirements.
- o Require a percentage of trade into and out of the country to be carried by US flag ships (every other country in the world does this—we don't).
- o Change crew rules and registration restrictions to make US ships more efficient.
- o Subsidize operations of US steamship companies, if necessary, to make them more competitive with vessels from other nations.

The military should as interim measures expedite conversion of the SL-7's to true roll-on/roll-off capability, expand the floating depot concept for prepositioned supplies, and work more closely with the Maritime Administration (MARAD) to apprise them of military requirements.

Other recommendations to improve the sealift capacity include (1) either revitalizing or scrapping the reserve fleet, (2) restructuring rules for Defense use of commercial vessels, and (3) forming bilateral agreements with other nations to cross-support sealift requirements during various contingencies.

C. Airlift.

Speed and flexibility make airlift an important ingredient of strategic mobility. The current airlift capability appears sufficient to meet personnel movement requirements, thanks in large part to the CRAF program. A larger (in numbers) cargo fleet would better balance the current passenger capability and would help solve some of the

sustainment problems. The biggest shortcoming is the capacity to move outsize cargo. The C-5 is our only airplane large enough to carry tanks and other heavy equipment and there just aren't enough C-5's available to match equipment deployment requirements.

On-going improvements to the military airlift fleet are probably the most effective and efficient method of increasing the airlift capability. Therefore, the additional buy of C-5's, the C-5 wing improvement program, the C141 stretch program, and the KC-10 procurement should be retained and expedited if possible. Development of the C-X (C-17) should continue and it should be procured as soon as practicable. The C-X would provide additional heavy lift and with its ability to land on unimproved fields would greatly assist in solving the intratheater transportation problem.

The US commercial air industry is in much better shape than the maritime industry. However, the seeds necessary for a similar disaster are already present—e.g. cutthroat competition, subsidized foreign competition, and exorbitant labor demands. The US government must do everything possible to keep this critical industry alive and well. Subsidies are certainly justified if necessary to compete with foreign lines and I would not discount a government owned and operated international airline if it was the only way to retain US flag service.

Like sealift, bilateral agreements for mutual airlift support is also a viable alternative for increasing airlift capacity. If we enter into bilateral agreements of this nature we must be careful to get something in return that is needed by the US. For example, additional passenger capability would not be of much benefit to improving our total airlift capability.

D. Intratheater Lift.

Intratheater transportation for the NATO scenario is highly dependent on host nation support. If this support is available in the quantity assumed then it appears to be sufficient to handle throughput requirements. If it is not available, then there is a serious shortfall. Other scenarios also rely, in some degree, on host nation support. Military assets for intratheater transportation are largely in Reserve Component units and they will need to be mobilized early and transported to destination. Actions to improve intratheater lift should key on alternate methods to move equipment forward. Adding more transportation units to the active structure is a hard sell and relying more heavily on host nation support may be dangerous.

The C-X aircraft provides a tremendous advantage because it is designed to land at forward airfield thereby accomplishing the intratheater segment as a part of the strategic lift. The military (all services) should continue to push for C-X procurement.

It is expensive to maintain a large ground transport structure in the active forces and for this reason we should continue to rely heavily on the Reserve Components to perform this mission. However, additional equipment such as trucks, trailers, and MHE should be prepositioned to conserve early airlift assets. If this equipment were designated "contingency only" it should be possible to procure simple and cheaper equipment than the military standard for this purpose. Another alternative that could be implemented is to train RC personnel and community support personnel in Europe how to drive commercial trucks and plan on them to "fall-in" on local vehicles during the initial stages of the war.

One of the most efficient ways to improve intratheater lift capac-

ity is to ensure that the host nation support concept is truly viable. Negotiations should continue to the point that specific assets and wartime assignments are matched, that rail and road repair materials are prepositioned, and that civilian personnel are aware of their mission and have received the necessary training. In Europe, this could be done by making logistics more of a NATO responsibility rather than a national responsibility. In other countries this could be done through bilateral negotiations and if necessary subsidizing host nation stand-by capability.

E. Destination Port Constraints.

Cargo off-load capacity at destination seaports has the potential to be the limiting factor in the entire strategic mobility equation. The causes of this potential bottleneck are: (1) dependence on host nation support, (2) characteristics of modern vessels, and (3) the all but nonexistent logistics over the shore (LOTS) capability. The host nation support problems are similar to those previously discussed for intratheater transportation. Modern vessels are larger than the WWII vessels and require deeper harbors and larger berths. Many ports in the world cannot handle these ships. Also, a large percentage of the US merchant fleet is non-selfsustaining and requires pierside cranes. Again, only the large ports in the most industrialized countries have this capability. If ports are not available we need the capability to deliver forces and supplies over-the-shore. This capability has all but disappeared from the US force structure. If a large scale LOTS operation was required we would have to delay operations until the industrial base could generate this capability.

The most flexible way to improve port handling capacity is to have

within our merchant marine a fleet of smaller self-sustaining ships that carry trade to developing countries. These vessels would be invaluable in the event of war and would do much to "show the flag" during peace. If the vessels were not profitable they could be subsidized—but, only after crew and registration requirements were eased.

Many exotic methods have been suggested to off-load non-selfsustaining vessels when shoreside cranes are not available. They are all slow and inefficient. The soundest way, in my opinion, is to build a floating prefabricated pier with an installed gantry crane and tow it to destination in the event of an emergency. Several of these piers should be built and prepositioned in places like England and Oman.

A viable LOTS capability requires trained units, amphibians, landing ships, and special MHE. There appears to be no alternative than to bite the bullet and fund the military structure (probably in Reserve Component units) to accomplish this mission.

F. CONUS Rail.

The capacity of the CONUS railroads to support movements to ports is marginal. It is quite obvious that more study is necessary in this area to determine total requirements and to then compare requirements to capacity.

One suggested improvement that appears to make sense is to develop a national defense railroad net structured after defense highway net.[38] This rail net would be the part of the current rail system that is necessary for defense. Federal funds could be used to assist in maintaining the track and roadbed to established standards.

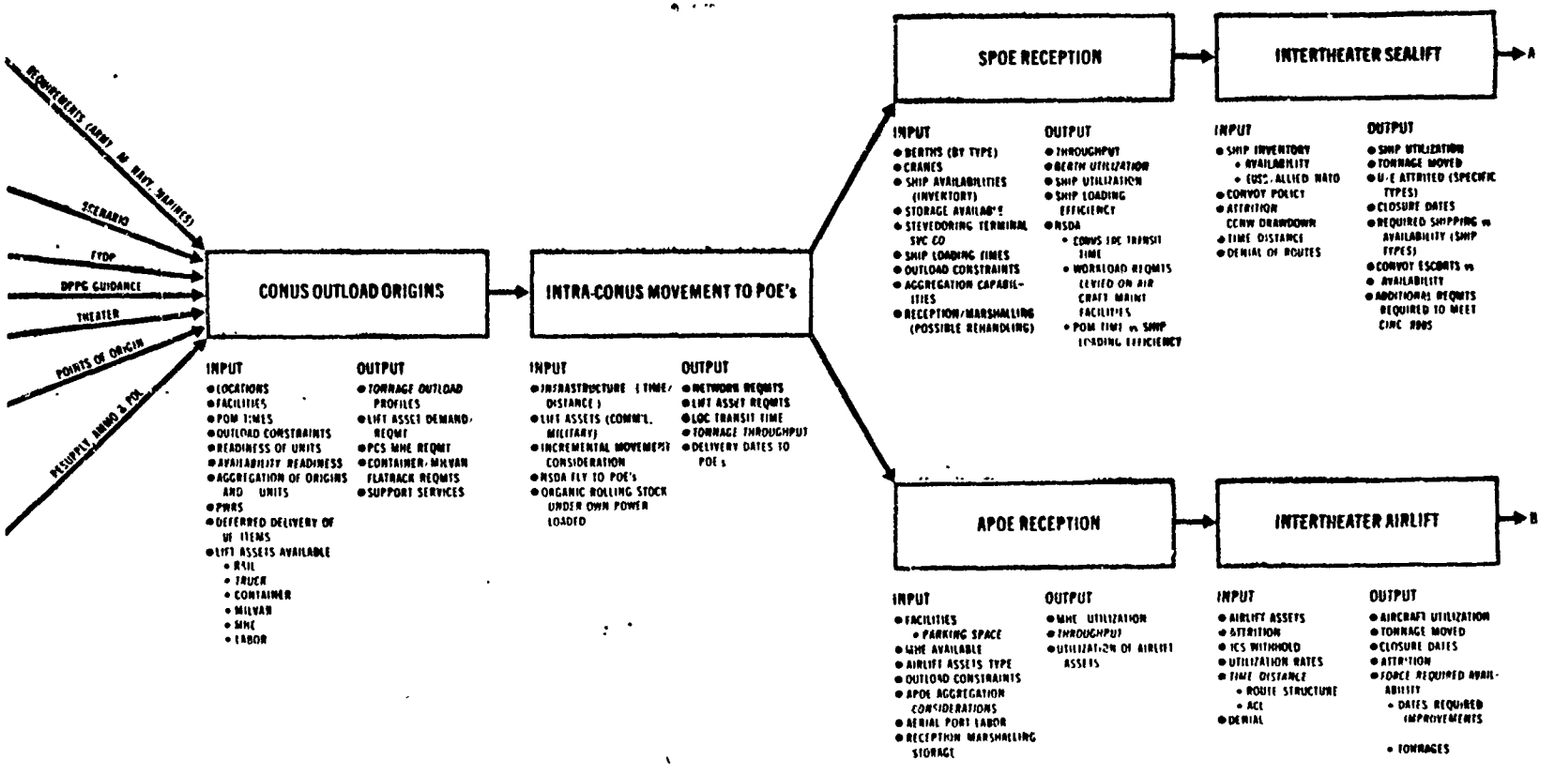
The size of the rail car fleet that is capable of carrying tanks has been questioned. If further study determines that more cars are

needed, then they should be procured with federal funds and, rather than placed in storage, leased to the railroads to generate income and assist in the movement of heavy commercial equipment. Defense would have first call on the cars in the event of an emergency.

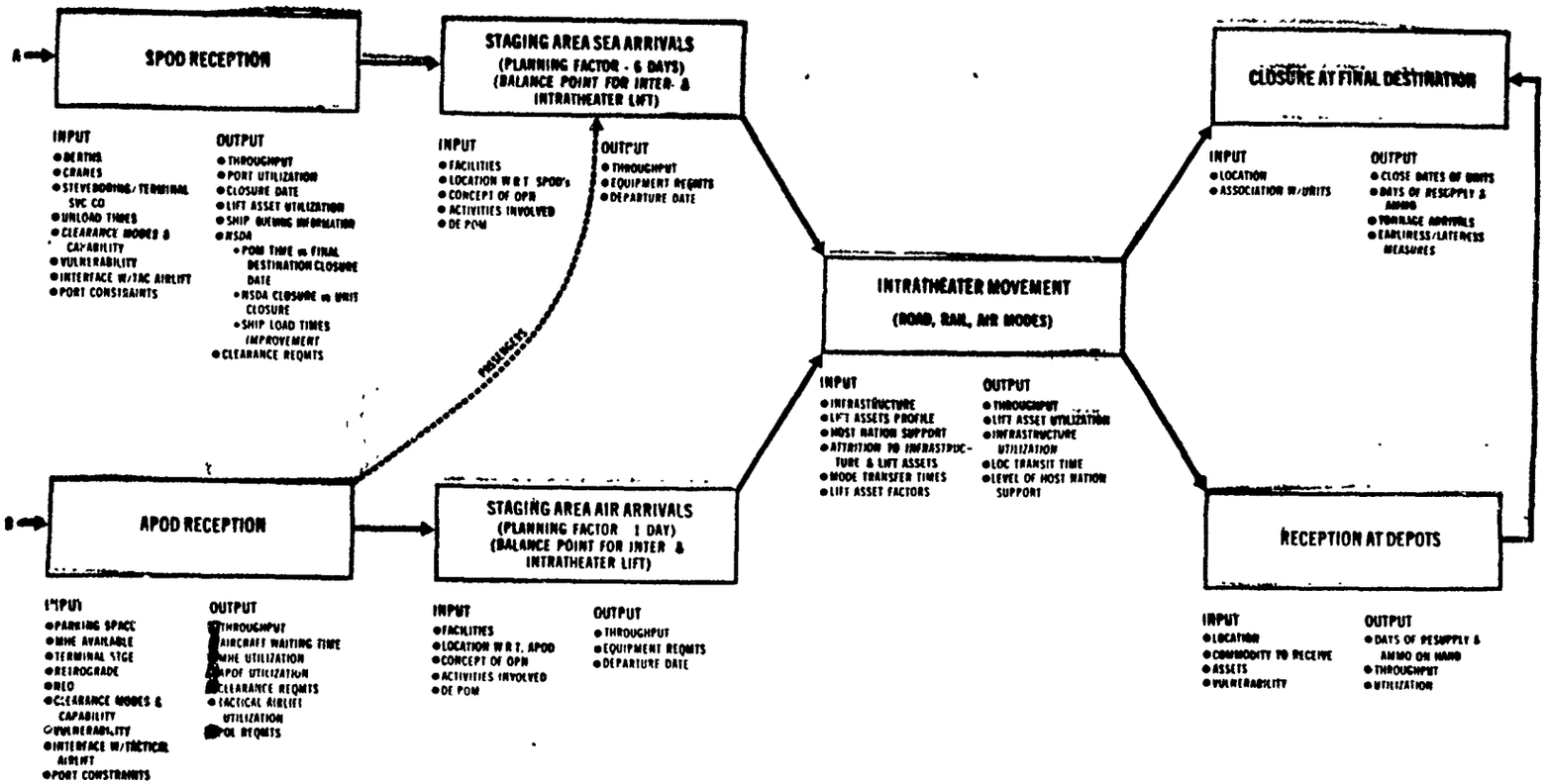
G. Summary.

There is overwhelming evidence that the strategic mobility capability of the United States is not sufficient to meet our worldwide commitments. We must either relook at the requirements or develop the necessary strategic mobility capability. This promises to be a long and costly task; but, if we are going to get our forces where they are needed, on-time, and support them once they are there we need to make improved strategic mobility a high priority national objective.

FIGURE 1: THE STRATEGIC MOBILITY PROBLEM



THE STRATEGIC MOBILITY PROBLEM (CONT)



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